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INFLUENCE OF ENVIR
INDUSTRIE

BY

OTIS TUFTON MASON.

FROM THE SMITHSONIAN REPORT FOR 1895, PAGES 639-665
(WITH PLATE LXIX).

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1896.

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By Otis Tufton Mason.

THE ARTS OF LIFE.

My part in this programme is to speak to you upon the influence of environment upon human industries or arts.

By arts of life are meant all those activities which are performed by means of that large body of objects usually called apparatus, implements, tools, utensils, machines, or mechanical powers, in the utilization of force derived from the human body, from animals, and from natural agencies, such as gravity, wind, fire, steam, electricity, and the like.

There is a study of the activities of life that belongs to natural history, being concerned with what men are and what they do as mere animals. They eat, drink, sleep, walk about, and help themselves to the bounties of nature, regardless of race. Their bones, muscles, and vital organs in their adult state, in their growth from embryo to decay, in their specific forms, are to be studied alongside of and in comparison with the same parts of other creatures. These natural activities of mankind constitute what, in old-time writers, was the natural as distinguished from the renewed man. In reality, all these natural endowments, along with other matters of which I am to speak, form part of the occasioning environment of arts and industries. But our concern now is with inventions, artificial implements, processes, and results. We have to study culture or the doings of the artificial man—the renewed man. All that he does through new devices constitutes his industries or his true industrial life. The higher any subspecies or race or nation has climbed into this renewed life the greater has been its culture.

THE ENVIRONMENT OF ARTS.

The environment of arts is really the sum total of all that is outside of and in touch with them, including the whole earth and all that on it dwell, the sun and the planets also, and many of the stars, since men

[1] Saturday lecture in Assembly Hall of United States National Museum, May 2, 1896.

guide their journeys by them, set their clocks and adjust their calendars according to their movements, and invent the most delicate apparatus to gaze upon them.

Practically, however, the environment of human arts is the combined action of the sun, the moon, and the earth, especially at any given place or in any culture center.

When you look at a terrestrial globe the first thing you notice is its smoothness and homogeneity. Now, if the earth were as smooth and homogeneous, that would end the matter. There would have been no arts, no lectures on their relation to environment, no audiences, and, to make a long story very short, no environment worth speaking about. If you were to look closely at a globe you would see that it is painted to represent a great variety of facts about the earth, to declare its physiographic outlines and features, its roughness and heterogeneity. To be precise, the earth consists of three inclosures—the land, the water, the air—enveloped in the all-pervading ether. The solid portion may be called the geosphere, the liquid portion the hydrosphere, the gaseous portion the atmosphere. These are not so many distinct things, like a nest of encapsulating boxes, but there exists the most intimate associations among them; they environ one another. The geosphere invades the waters and the air. Nowhere are the waters and the atmosphere free from the invasion of solid particles of matter. The hydrosphere invades the other two, rising into the atmosphere in enormous quantities, and sinking into the earth to unknown distances. Finally, the atmosphere is found permeating the waters, making life possible, and finding its way deep into the structure of the solid crust. The components of the air and of the waters are also the chief ingredients in the structure of the solid portions. There is no element in the air nor in the waters that does not exist in another form in the earth's crust.

I speak of this to impress upon your minds the fact that this mother planet of ours is not a mere pile of substances without interest in one another, but a very carefully organized body to do a certain kind of work. I shall not now stop to inquire whether it was intelligently planned to do this wonderful work, of which I shall soon speak, or whether the work is simply the result of its cooperative activities. It will suit my present purpose if I can get you to see with me this marvelous set of terrestrial cooperations.

THE SUN AND THE ENVIRONMENT.

The sun in its relation to the geosphere, the hydrosphere, and the atmosphere forms a part of the environmental cooperations. Our distance from the source of heat and light and actinism, our curve and velocity about it and the speed of diurnal revolution, the degree of inclination of the earth's axis of revolution to the plane of its annual path, and, finally, our journey with the sun through space are all a part of one scheme or congeries of natural phenomena out of which the

minutest phases of our industrial life spring. By a simple diagram (see plate) this action of the sun and interaction of earth strata may be shown. The ancients divided phenomena into those of earth, water, air, fire—not a bad division when we are considering the influence of environment on human actions.

The terrestrial fires are responsible for the corrugations on the earth's crust. The solar fires, in cooperation with the moon and the earth's motions and its inclination in its orbit are responsible for the movements of the waters and the air in tides and climate and all the marvelous changes included in that word. The waters of the earth preserve tolerably well the spheroidal form, and the winds and climates of the seas conform to the simple laws of spherical motion under given conditions. The lands projecting from the seas by their elevations and conformations modify the movements of the air and the waters so as to re-create themselves. The winds of the Atlantic, saturated with moisture, sliding westward as the earth spins eastward at the rate of a thousand miles an hour, strike against the mountain barrier of the two Americas. Their waters are precipitated in deluges on the lowlands and blizzards of snow on the high mountains. This provokes the action of disintegrating frosts, of avalanches, of glaciers, of torrents, of rank vegetation to break down the mountains and form the continents eastward. On the contrary, west of this vast upheaval the winds from which the water has been wrung turn the western slopes almost to a desert.

The Eastern Hemisphere has other codes of behavior for the earth, the air, and the water. The results are the long slope toward the Arctic and a series of rivers whose mouths are stopped with ice at the moment when their higher channels are in the periods of inundation. The Russian and Siberian wastes are the result, and the long north sloping Piedmont from the North Sea to Lake Baikal.

These coordinating activities result in the rich rivers of China, the garden spot of Japan, the overwatered regions of southeastern Asia, the great desert region of central Asia, the varied climate of India, the excessively complex arrangement of elevation, heat, precipitation, and water front about southern and western Europe. In Africa and the Indo-Pacific Archipelagos the phenomena also form part of a single scheme.

To the arts of man all mountains, all rivers, forests, prairies, and deserts are necessary,—the deep sea no less than those prolific feeding grounds into which early men ventured and learned their first lesson in self-confidence, the end of which would come to be familiarity with the whole globe.

In fact, the whole world is now, and always has been, a single environment for man, fitted up with more or less spacious environments in which the first human groups settled, and as they became richer and stronger they took larger and larger apartments. Each one of these environments had a character of its own and the only possibility for a

race to occupy more than one was to become more and more artificial and to multiply its wants.

SPECIAL ENVIRONMENTS.

In this connection, it will be profitable to note how the cosmic forces have cooperated to create special environmental relationships in the three kingdoms of nature. The arts of mankind have to do with the mineral, vegetal, and animal resources of the earth, to procure them, to manufacture them, to transport them, to count, weigh, measure, and value them, to exchange them, and to enjoy them, in answer to an ever-increasing body of wants, working them as materials by means of tools and machinery, according to methods which constitute the processes of the arts, always with definite ends in view.

Now, these three kingdoms of nature, though they may have no king apparent to our senses, are far from being for our race a purposeless rabble. As with the three spheres of the earth, they also play into one another indefinitely under the sway of the imperial sun. This relationship has been represented as in the diagram (see plate).

In the case of the spheres, it was easy to see that if the earth were perfectly homogeneous and smooth the movements of air and water would be tolerably uniform; but as things are arranged this would not be so with our three kingdoms. There would be tropical, temperate, and arctic plants and animals even then. But with the present order of contours and movements in the atmosphere, hydrosphere, and geosphere, the kingdoms of minerals, vegetables, and animals undergo an endless variety of changes, creating no end of subvarieties in the environments and stimuli to action and artificial life.

The mineral kingdom is awakened by the sun; not only its mechanical movements are quickened in the air, the water, and the earth, the currents of the ocean, the rains, snows, ice, frost, and heat, but somehow his beams are entangled with life itself, for only in his presence are the fields and forests clad in emerald, the organs of regeneration made resplendent in flowers of every possible hue, and new beings come into life at his bidding. It is only in the unfathomable abysses and in the unillumined earth that life is not. The stream of life flows into the vegetal kingdom through the mineral, and a return current brings liberated oxygen and the products of decay. The stream of life flows from the vegetal into the mineral with return currents of carbonic acid gas, decayed matter, and the preparation of the soil. The stream of life descends from the animal to the mineral, with return currents in the form of air to breathe, water to drink, and a host of mineral substances wrought into our blood, brains, and bones.[1] The invisible

[1] Dr. C. Hart Merriam's studies in the relation of fauna to annual heat units is interesting in this connection, since they really stand for the total solar force, luminous, actinic and heating. (Smithsonian Report, 1891, pp. 365–415.)

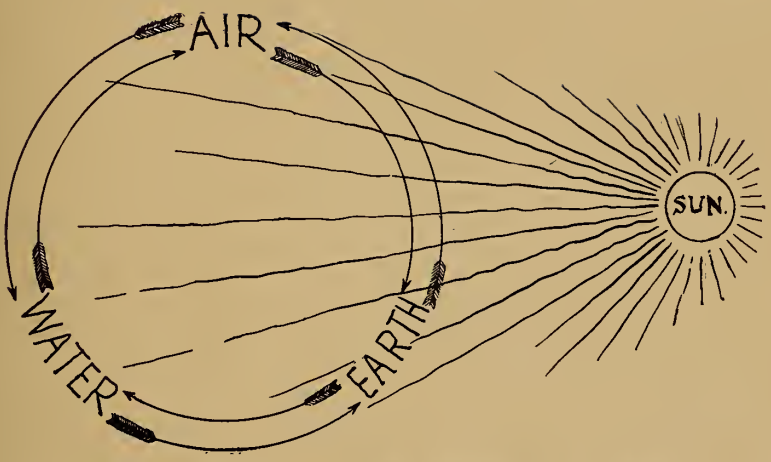

FIG. 1. Chart showing how the sun, operating on the geosphere, the hydrosphere, and the atmosphere, makes of them a single environment for the whole human species. The air invades the earth and the waters; the waters invade the earth and the air; the earth invades the waters and the air. Their mutual activities depend upon the sun.

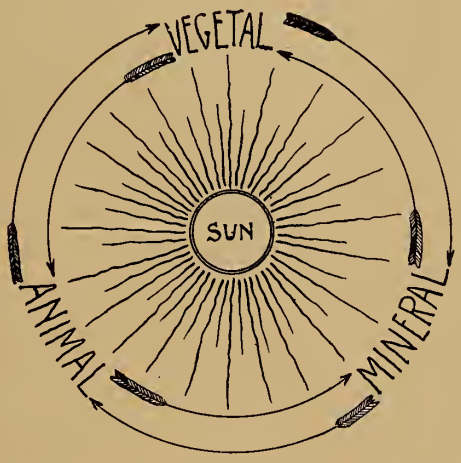

FIG. 2. Showing how the three kingdoms of nature are in their totalities under the rule of the sun and how their interdependencies are created by that luminary, the whole constituting a single environment of man.

motions produced by the sun's force becomes visible in the rising vapors; the motions of the air in the movements of the clouds; the secret motions of the snow and rain, the dew and the frost in the downward movement of the lands; the unseen movements of the land appear in the families, genera, and species of animals; finally, the distribution of these reveal themselves in ways not known to us in the specific cultures of mankind belonging to the areas where they arose.

Do you not see that the total result of these natural activities gives us a world that almost mimics a thoughtful being, with something to bestow, many things to suggest, power unlimited to lend, and, mark me, an intelligent discrimination of rewards and punishments whose effect has been to glorify the good and to destroy the unfit.

I do not say that the world is alive and thoughtful, that its provinces or areas of separate environmental characterizations are each governed by a viceroy, but the law of the ingenious mind of man working in these makes it appear so. His subjective activity is projected upon the background of the earth, until it is quite certain that he is in cooperation with the power that governs it. It is not yet decided how far this force obtrudes itself upon his will, since it is certain that his conservatism impels him to certain activities against the environment.

KINDS OF ACTIVITIES.

There are six kinds of human industrial arts as regards the environment, to wit:

(1) Taking the gifts of nature: Man is then a quarryman or miner, a gleaner, a fisherman, a hunter, and later a domesticator.

(2) Changing the form of natural objects: Man is then a manufacturer, mechanic, artisan, an inventor of tools and machines.

(3) Changing the place or position of himself and of things: Man is then a traveler, a carrier, an engineer, a subduer of force.

(4) Intelligent accounting for things and measuring: Man is then a statistician, a measurer, surveyor, gauger, weigher, a maker of clocks and almanacs, a scientific explorer.

(5) The exchanging of the fruits of labor, commerce, business, money: Man becomes a merchant.

(6) The arts of enjoyment: Man becomes a user of food, houses, furniture, utensils, equipage, fine art in all its branches.

It is certain that we are brought into relation with nature or environment in and by all of these. Indeed, it is due to the great diversity of environments that they are all possible. If you will run your eye along the perspective of human history, you will see cultures running into one another like the streams of a river or the lines of a great structure. Each culture was developed in a special environment. The union of two environments eventuates in the union of two cultures, widening both.

CHARACTERISTICS OF ENVIRONMENT.

We may now be allowed to enumerate some of those characteristics of this composite nature of things whose influence upon our daily activities we are now contemplating. And first we can not help seeing that the environment is the provider of all raw materials. This seems trite, and in its simple statement may be so. But see how each people of the earth is characterized by its raw materials. An Eskimo collection is white; the same ideas are expressed by the Haidas south of them in jet black. The art of the British Columbian is red, of Oregon and California yellow, of the Pueblos écru, of Mexico gray. All this is plain enough when you know the color of walrus ivory, of slate, and mountain goat horn, of cedar, of grasses and spruce root, of fire clay when baked, and of volcanic building stones. People express themselves in the material at hand. The Egyptian was furnished with limestone and syenite, so he hammered away at that. His ideas could mount no higher than the material. On the other hand, the Greek was provided by environment with the whitest, finest, and thickest quarries of marble on earth. It was expected of him that he should give the highest expression of the æsthetic faculty in sculpture and architecture, though his pottery was somewhat inferior. When the whole world is brought into one environment by the art of transportation, then other lands have hope to imbibe some of the genius engendered and fostered about the quarries of Pentelicus. But in the generative period of industrial forms, before the world-embracing commerce, it was not so.

Nature or environment appears to us, secondly, in the light of a purveyor of force. At first our race had only the force of its own frail but versatile bodies to depend upon, yet men will never cease to marvel at this mechanism as an economic device for storing and utilizing power. Whether we regard a machine in the light of saving fuel, of speed, of ability to change rectilinear motion readily into that of any curve or succession of curves, the body of man will ever remain for inventors to wonder at and imitate. Long ago backs and hands and feet were wearied with ever-increasing burdens, and so the dog, the reindeer, the horse, the ass, the cow, the camel, the llama, the elephant, and even the sheep were handed over in innumerable packs and herds to give additional power to industry. These creatures not only fed and clothed men, they made men's legs longer, their backs stronger, their hands more skillful. Then came the wind to blow upon the mat, the sail, the mill, and the water, moving in its natural currents and then in artificial channels to turn the wheels of industrialism. How bountiful has nature been in the supply of force! Who ever dreamed of exhausting it? How many ships upon the sea would it take to use up all the winds that blow, and how many turbine wheels would it

require to take up and transform into useful arts the force of all waterfalls?

It is true there are environmental gifts that may be ruthlessly wasted. As Professor McGee has shown, the resources of fertility wasted in the United States every year exceed those reproduced in crops. Six hundred million tons of coal are the output annually in the United States. Many species of most useful animals have been irretrievably extinguished, but who ever thought of exhausting gravity, elasticity, the mechanical powers, the forces of the environment. However, we must admit that even these natural forces are unequally distributed, and that gives character also to the arts. There are no turbine wheels in the desert, no sails cross the zone of calms, and each domestic animal has its geographic range beyond which it becomes unprofitable.

In the third place, the environment manifests itself as the teacher of industries. I should be the last person in the world to rob the ingenious mind of man of its glory in achievements through human industry; but the fact remains that wherever you enter his workshop, called the world, you will see hanging on the walls and lying about him all sorts of patterns and models, and a multitude of processes are going on which he falls into as "heir of all the ages."

There were cave dwellers before there were men; spiders, mud wasps, beavers, and birds spun and worked in clay and cut down trees and made soft beds for their young long ago. Plants reared vessels and mollusks produced dishes that even now are the patterns of the most skillful potters. There were hammers, gimlets, pins, needles, saws, baskets, and sandpaper at hand when the human artisan first became an apprentice. And I would ask you whether there is any possibility of this suggestiveness of nature ever being exhausted. Whisperings are yet going on in her school. The little birds have not told all the secrets. The processions toward the patent office prove that the growing coordinations of environment in relation to the common industries have turned the village school, with its circumscribed advantages, into a world-embracing university.

Lastly, I must not fail to tell you that the environment itself is capable of unlimited education and improvement in relation to the commonest wants of life and our ways of satisfying them. There is one thought about the nature of the common things among which we mingle that fills me with ever-increasing delight. It is the sympathetic response of nature or environment to every affectionate touch. An industrious and wise farmer settles upon a piece of land. Soon you behold remunerative crops replacing the forest and the waste. The man is enriched; he then enriches the land, and by a kind of mutual admiration they two grow fat together. When a progressive race has settled down in a part of the earth not too icy, not too torrid, not

discouragingly luxuriant, not absolutely a desert, the same has been true. The wild and cooperatively relentless wolves have become faithful dogs. The capability was slumbering there. The feeble grasses are transformed simply by giving the best a chance into prolific grains. The modest wild flower becomes the florist's delight, landscape gardening the composite expression of all æsthetic pleasures in form, color, number, odor, and motion. Professor McGee has called our attention to the partial desert as the best possible arena for starting certain forms or epochs of this artificial life which we are now considering, and it is. Indeed, in this perfectibility of the environment of which I am now speaking it seems to be the manifest destiny, the natural proclivity, the ambition of the desert to blossom as the rose. How delightful to contemplate this readiness of nature to respond to the touch of man.

AMERICAN ENVIRONMENTS.

It must have frequently occurred to my hearers that the more circumscribed the environment the more dependent the activity must be upon it and therefore the more monotonous the life must have been. This is true in the kingdoms of life and also true as among genera and species of animals. It has been also true among the races of men. The best examples, therefore, of environment affecting arts and industries will be found where the tribes are still living in the endogamic stage of social culture, so that the happy arrangement between the arts and their surroundings have been as little disturbed as possible. Taking the Americas at the time when they were first revealed to the historian you will find that they range through natural conditions diversified enough to bring into prominence arts adapted to each culture area and obtrusively different from those of other areas.[1]

For our present purpose, there may be said to have been eighteen American Indian environments or culture areas, to wit: Arctic, Athapascan, Algonquian, Iroquoian, Muskhogean, Plains of the Great West, North Pacific Coast, Columbia drainage, Interior Basin, California-Oregon, Pueblo, Middle American, Antillean, South American Cordilleran, Andean Atlantic Slope, Eastern Brazilian, Central Brazilian, Argentine-Patagonian, Fuegian.[2] These will be given seriatim with the factors constituting the motives and processes of the arts of life. A table will follow with the factors at the top. By writing the characteristics of each factor for each environment you would have at a glance

[1]These culture areas should be compared with Major Powell's linguistic map, 7th An. Rep. Bur. Ethnol., with Thomas's mound maps, 12th An. Rep. Bur. Ethnol., with Bancroft's geographic areas in his Native Races of the Pacific States, but especially with Franz Boas's Anthropology of the North American Indians, Mon. Internat. Cong. of Anthrop., Chicago; C. Hart Merriam's Geographic Distribution of Life in North America, Smithsonian Report, 1891, and J. A. Allen's Geographic Distribution of North American Mammals, Bull. Am. Mus. Nat. Hist., New York, Vol. IV.

[2]See Powell (J. W.), 7th An. Rep. Bur. Ethnol.; Brinton (D. G.), The American Race, New York, 1891.

the whole result of our inquiry. This elaboration may be tabulated to any degree of minuteness, but for the present we must be satisfied with—

(1) Climate and physiography;
(2) Predominant minerals, vegetables, animals;
(3) Foods, drinks, narcotics, stimulants, medicines;
(4) Clothing and adornment of the body;
(5) House, fire. furniture, utensils;
(6) Arts in stone, clay, plants, animal tissues;
(7) Implements and utensils of fishing, hunting, and war;
(8) Locomotion.

ENVIRONMENTS AND CHARACTERISTICS.

The Arctic environment, according to the eight classes of characteristics laid down, may be thus defined as having—

(1) Intensely cold climate, six months day and six months night, abundance of ice and snow, no vertical zones, much water line and level coast.

(2) Chert, slate, soapstone, pectolite; driftwood, wreckage, no timber, berries; aquatic invertebrates, mammals and birds, reindeer, land carnivores, and rodents.

(3) Little vegetable diet, meat of fish, birds, aquatic mammals, and deer; pipe and snuff introduced.

(4) Dress of furs, birdskins and intestines, labrets and tattooing.

(5) Underground houses or igloos, snow house, stone lamp-stove, steamed wood for dishes.

(6) Chipping, sawing, boring, grinding, and carving stone; carving bone, antler and ivory; a little pottery at Bristol Bay; textile in basketry, sinew twining and braiding, tailoring in skins; ingenious weapon makers.

(7) Hunting implements, harpoons, bird darts, fish darts, lances, fishhooks, nets, composite bows and arrows.

(8) For travel, poor snowshoes, ice creepers, sleds, kaiaks, umiaks.

The Athapascan environment has the following characteristics:

(1) The drainage of the Yukon and the Mackenzie and the barren ground southward to British Columbia.

(2) Poor in the industrial minerals; birch, conifers, and poplars; fish, birds, caribou, bear, and fur animals in profusion.

(3) Fish, meat, berries, cooked by boiling with hot stones or roasted.

(4) Deerskin clothing, with or without fur, bonnet, shirt, pantaloons, moccasins; much ornamented; no tattooing.

(5) Bark lodge, movable; bark and basketry dishes; fur bedding; open fire.

(6) Manufacture of hunting implements, basketry, bark work; excellent skin working; no pottery.

(7) Plain bows, arrows with bone heads, lances, fishing nets and hooks, gigs.

(8) Snowshoes of finest webbing, sleds, bark canoes.

The Algonquin-Iroquois characteristics of environment are:

(1) Climate temperate to subarctic; wide expanse of lowland; extensive inland waters and indented Atlantic coast.

(2) Materials for industry, quartzite, diorite, sandstone, etc., for chipping, battering, and polishing, and mines of jasper, copper, and steatite; hard wood, birch, conifers, wild rice; game birds and mammals, fish, mollusks.

(3) Dietary of great variety in the animal products of land, fresh water, and salt water; maize, pumpkins, beans, natural fruits; boiling with stones or in pots, roasting; tobacco pipe.

(4) Shirt, breech clout, leggings, moccasins of tawed skin, in winter fur clothing; body frequently exposed in the southern part of the area.

(5) Dwellings of bark lodges, skin lodges, bark and skin long houses or arbors, communal barracks, village camps; fires in center; little furniture; extensive use of mats woven or sewed together, and skin robes. In this area there are the largest number of geometric earthworks, fortifications, mounds, and shell heaps.

(6) The arts were not of high order; they included chipped, battered, and polished stone; poor, red pottery; bark, dugout, and wicker vessels; quill work; tawed skin, sinew, and thong or babiche work; mortar grinding.

(7) The weapons of war and capture were clubs, stone knives, lances, plain bow and stone-pointed arrows, barbed spears, fish pounds, traps, hooks, gigs, scalps were taken.

(8) They traveled afoot, along well-known trails, on snowshoes in Canada; on the water in birch canoes or in dugouts; portages.

The Muskhogean area includes the Southern States of the Union below the northern boundary of Carolina. In it were other tribes and parts of Northern families, but the area dominated the activities of all.

(1) Low mountains, rich river valleys, abundant rain, ocean and gulf coast, climate temperate to subtropical.

(2) River gravels, and mines of flint, mica, and copper; abundant timber, cane, tobacco, and natural fruits; deer, turkeys and other birds, fish and aquatic invertebrates in profusion.

(3) Food of maize, melons, pulse, fruits, the products of the chase, and the rich harvest of the waters; roasting, pot boiling, baking in hot ashes, smoked and fire-dried food.

(4) The dress of this area was partly of tawed skins, little clothing was worn, in fact. The caves reveal capes and petticoats of bast and native hemp, woven and fringed. Feather work, shell beadwork, and pearls were used in profusion.

(5) They lived in small huts and grass lodges and in wattled houses daubed with mud. These were collected in fortified villages. The furniture was of cane and matting, vessels of clay and diagonal basketry; open fire. Here abound geometric mounds and earthworks, shell heaps, and shell mounds.

(6) The arts were chipping, pecking, and polishing stone; pottery making of a distinct school; twined and plaited textiles of cane and native hemp; feather working; grinding in log mortars.

(7) The weapons of capture and war were plain bows, reed arrows, reed knives, stone tomahawks, lances with stone points, clubs for braining.

(8) Traveling on foot, and packing; on water were used canoes hollowed from the soft poplar and gum trees, which are abundant.

The plains of the Great West have constituted a definite culture area characterized by—

(1) A piedmont sloping down to the immense prairies of the Missouri, the Platte, and the Arkansas; temperate climate.

(2) Few good industrial minerals and those prized and guarded by intertribal agreements; plants restricted to small trees for tent poles, arms and cradles, apocynum for textiles; buffalo overwhelmingly.

(3) The dietary was meat flavored and supplemented with berries; kinnikinic; no farming.

(4) Skin clothing in excess, hood, shirt, clout, leggings, moccasins, robes; paint the body.

(5) Skin lodges in circles; earth lodges like those south; furniture of hides, fur, and intestines; dung for fuel; jerked meat; stone boiling in small pits lined with rawhide; roasting.

(6) Stone chipping, pecking, carving, and polishing a little; skin dressing, tailoring, embroidery in quill, spinning flax without spindle occupied the entire time of the women. The men were hunters preeminently.

(7) The weapons of capture and of war were compound, sinew-backed, and self-bows, and stone pointed arrows, stone tomahawks and cassetetes, clubs armed with jagged blades, lances.

(8) Travel was on foot and the dog was a beast of burden; for crossing rivers the bull boat or buffalo-hide coracle was ever at hand.

The North Pacific area extends from Mount St. Elias to the Straits of Fuca, embracing Tlingit (Koloschan), Haida (Skittagetan), Tsimshian, and Nutka, or Wakashan, tribes. Its characteristics are:

(1) Moist, temperate climate; archipelagic and mountainous coast.

(2) Its material resources are slate and granular rocks, immense forests of conifers, sea fauna inexhaustible by savages, herring, salmon, halibut, oolachon, mollusks of great size.

(3) Fish diet, mixed with fruits; no grain; snuff and tobacco; stone boiling and roasting.

(4) Woven clothing of goat, sheep, and dog hair and cedar bark; labrets and tattooing.

(5) Their dwellings were communal barracks, with totem posts; central fires; furniture and utensils of stone, wood dugout, woven bark, and exquisite twined and checker basketry.

(6) Their arts were stone carving by battering and scraping, no chipping; wood carving, twined and plain weaving; no pottery.

(7) The weapons of war and capture were retrieving harpoons, gigs, and the like; fish traps, clubs, few appliances for land animals.

(8) They traveled in dugout canoes altogether, keeping close to shores and water courses. At the extreme north the fine snowshoe, borrowed from the Athapascan, was in vogue.

The Columbia drainage area includes the entire basin of that stream and some contiguous patches. It is very different from the foregoing, having the following characteristics:

(1) Stern, islandless coast, but prolific tide water and streams; rich lands; mild climate.

(2) Its material resources for savagery are siliceous and granular rocks; textile plants and forest quite varied; salmon and waterfowl; abundance of edible roots and fruits.

(3) Their dietary included fish and mollusk, with camass, kouse, and other roots and fruits in abundance; no agriculture; stone boiling and pit roasting.

(4) The tribes dressed partly in skins, partly in textile garments, but the mild climate allowed them to expose their bodies much.

(5) Their houses were likewise communal barracks, with interior inclosures, but the huge totem post is lacking; furniture of greatly varied matting, wallets, rigid baskets.

(6) The arts were chipping and battering stone; no pottery; many types of weaving and basketry, including plain, checker, diagonal, twined bird cage, coiled meshes, and stitches; an exceedingly mixed region.

(7) Their weapons of capture and war were bows and arrows, harpoons, lances, clubs, hooks, and traps.

(8) They traveled in bark canoes, Amoor type, and near the salt water in excellent dugouts. On foot in winter they used coarse snowshoes.

The interior basin of the United States includes the lands between the western slopes of the Rockies and the eastern slopes of the Sierras. It lies north of New Mexico and Arizona, and includes the most of Colorado, Utah, Nevada, eastern Oregon, Idaho, and a corner of Wyoming. Its characteristics are:

(1) Partial deserts among mountains with rich and wooded patches.

(2) Materials for savage arts, siliceous and friable stone, deer, antelope, and other game, few fish, nutritious plants, poor timber, and textile plants.

(3) Diet meager, meat scarce, bread, mush, and soups of acorns and wild plant seeds; insects and grubs eaten; cooking with hot stones and roasting or parching in trays with hot stones.

(4) Buckskin shirts, clouts, leggins, moccasin excellent, hats of coarse, twined basketry; no tattooing.

(5) Shelters of brush by the side of bluffs or in the open; partial cave dwellers; stick beds, vessels of basketry dipped in pitch; no pottery; fire out of doors.

(6) Chipping stone, good skin dressers, basketry in twined ware, rough and coarse by reason of the material; excellent gleaners and millers.

(7) Their weapons are sinew-backed bows, short, stone-pointed arrows, clubs, and land nets.

(8) Traveling on foot, no artificial appliances for land or water; carrying in conical baskets by means of headband.

The Californian-Oregon area embraces a part of Oregon and all of California, except the southeastern third. Its characteristics are:

(1) A series of short and isolated valleys, descending to the ocean, and without harbors, or to San Francisco Bay. Though there are mountains, there are no vertical zones of culture. The climate is vigorous and salubrious. The isolation is obtrusively shown in the fact that here twenty-six linguistic families were packed.

(2) Materials for arts were siliceous stones for chipping, superb; no fictile clay; fibers, fruits, and woods excellent; fish and game plentiful.

(3) Diet of acorns, seeds, fish, birds, and mammals. Cooking with hot stones in mush and in pits; open roastry; tubular pipes.

(4) Dress of buckskin, rabbitskin, and grass fringes, scanty; tattooing.

(5) Insignificant shelters, varied, partly below ground; granary baskets; shell heaps.

(6) Stone chipping admirable; stone and basketry mortars; basketry of every type in seven distinct species of weaving; flax twine.

(7) Weapons, neatly made sinew-backed bows and elegant arrows in many styles, with most delicate stone points; fish spears, retrieving arrows, fish and animal traps.

(8) Poor boats; rafts and balsas in the south; snowshoes rare and rude; conical baskets and carrying bands.

The Pueblo culture area includes New Mexico and Arizona, with extensions into Utah, southern California, and northern Mexico. Its characteristics are:

(1) Arid, hot climate, elevated mesas, canyons, irrigable valleys, mountains.

(2) Materials of industry, shales, clays, turquoise, volcanic rocks; mesquite, oak, cottonwood, yucca, basket shrubs, cultivated foods, and fruits; deer, rabbits, goat, mountain lion, coyote.

(3) Maize, pulse, melons; little meat until the introduction of sheep; griddle cakes, mush, and pottage; cigarettes.

(4) The clothing is somewhat scant, for a long time of buckskin and woven fabrics, formerly rabbit-skin robes, feather robes, weaving in apocynum and agave fiber, paints, no tattooing.

(5) Pueblos, either underground, crater, cave, cavate, cliff, mesa, or lowland; towers.

(6) Chipping, polishing, and boring stone; smooth and painted pottery in great profusion; mythological in motive; basketry in wicker, diagonal, twined, and coiled ware; weaving in frames and with grating harness, in plain and diaper; wrapped ornamentation; bone and horn work rude; mealing stones in sets; sand painting, irrigation.

(7) Weapons of war and the chase were bows and arrows, shields, rabbit clubs for throwing, land nets, clubs.

(8) On foot only, no conveyance by land or by sea; carrying on the head with ring, or on the back with forehead band.

Middle American culture area, including southern Mexico and Central America. The characteristics are:

(1) Mountains, terraces, and table-lands; vertical zones of climate from torrid seacoast to temperate uplands; wet and dry season; no good harbors; culture forces centrifugal.

(2) Materials are obsidian, volcanic building stone, gems; yuccas, agaves, excellent timber, cotton, food plants; animals inferior, abundance of beautiful birds, fish and shellfish on the coast.

(3) Food largely artificial, of maize, pulse, flesh, fish, chile in many forms; chocolate, pulque.

(4) Sandals of fiber, scanty body garb of poncho and serape, straw hats, feather clothing superb, labrets.

(5) Thatched hut, open fire, hammock, pyramids, great buildings of hammer-dressed and carved stone; vessels of gourd and clay.

(6) The arts were mining, metallurgy, stone cutting, gem cutting, grotesquely modeled pottery, loom weaving, netting, feather embroidery, gourd work, metate milling, paper and bark cloth; irrigation.

(7) Weapons were atlatl and spear, bladed clubs, obsidian daggers, bow and sling not prominent.

(8) Dugouts and reed floats, canals, professional carriers, headband and breastband.

Antillean or insular area, called also the West Indies. To this region belongs also southern Florida, a portion of the northern coast of South America:

(1) Perpetual summer (77° to 82° F.); mountainous insular areas in deep, clear sea; currents northwestward; islands easily accessible one from another.

(2) Granular stone, little for chipping, great canoe trees, cacao; mollusks and fish; great mammals, none.

(3) Dietary of manioc, sweet potato, cacao, fish, iguana, turtles; snuff and cigarettes.

(4) Clothing meager, of vegetal fiber wholly.

(5) Thatched shelters near the sea chiefly, pile dwellings, hammocks, no storage, open fires, and hammock fires.

(6) The arts of Antillean peoples: Excellent carving and polishing of stone and wood; red pottery rudely modeled and engraved; diagonal weaving, metate grinding, canoe making.

(7) Weapons were spears, clubs, tomahawks, with celt in perforated handle.

(8) Sandals for foot travel, dugout canoes; carrying on the head, perhaps introduced from Africa.

South American mountain or Cordilleran culture area, including the

mountains and especially the Pacific slope of Colombia, Ecuador, and Peru. The families of Indians were those usually called civilized. The characteristics are:

(1) Elevated and continuous plateaus broken here and there by lofty mountains, beneath the plateaus vertical zones of climate; generally arid, desert in the south; gorges in the west slope, coast plain little indented; culture forces centripetal.

(2) Materials of arts, volcanic, architectural rocks, gold and silver; coca, reeds, cinchona, cacao, maize, potato, beans, fish, llama, guanaco, vicunya, paco; timber scarce.

(3) Food of frozen potatoes on the plateau; maize, beans, meat, fish, lower down. Coca is chewed to economize strength.

(4) The clothing was woven stuffs of llama wool and cotton, fine in quality and characteristically figured; sandals.

(5) The buildings were thatched huts in fortified villages, furnished with hammocks or beds on the ground; open fire, dung fuel, griddle and pot cooking.

(6) The arts were hammering and carving of stone, building with huge blocks, metallurgy, pottery modeling and molding; diagonal, twilled, and open weaving; irrigation, quipu.

(7) Stone-headed club, sling, wooden saber.

(8) Traveling afoot, or on balsas of logs or reeds; carrying on human backs or llamas, post roads and suspension bridges.

Andean Atlantic slope, including the eastern margin of Colombia, Ecuador, Peru, and Bolivia. It is in fact the loop in which arise the great rivers that feed the Amazon. Its characteristics are:

(1) A tropical piedmont, sloping eastward, profusely watered and forested.

(2) Its resources for culture have been little studied; mineral substances are little used; the vegetation is absolutely overpowering.

(3) The food of the scanty population is fish, monkeys, peccary, and such natural fruits as may be found.

(4) Little or no costume was anciently worn, except in the form of ornament, which consisted of gorgeous plumage of birds sewed to bark cloth and teeth and pretty seeds and wings of gorgeous beetles strung in armlets, leglets, and necklaces.

(5) Wooden houses thatched with palm leaf were the habitations, with sleeping bunks.

(6) The arts of life were those of savagery alone; little agriculture was known. To hunt, to fish, to war, to combat nature and one another was their continuous occupation. They were good woodworkers and feather workers; had no pottery.

(7) Weapons in this area were and are blow tubes and poisoned arrows, rectangular sectioned, long bows, shields, trident lances, throwing sticks, drum signals, dried heads, ourari.

(8) Travel afoot in the forests, now using the ever faithful machete; use headband in carrying; water travel in canoes down the cataracts of the upper rivers.

Eastern Brazilian area, from the Tocantins River eastward. The characteristics of this area are:

(1) Tropical climate, elevated table-lands between sierras, forested, rivers filled with cataracts.

(2) Little economic stone for savagery, or rather other useful substances easier to work more abundant; gems; vegetation immense; food mammals scarce; birds of plumage, fish, and marine invertebrates plentiful.

(3) Food partly natural, partly cultivated, cassava, fish, mollusks, turtles.

(4) Clothing little or none, bark cloth; decoration of the person with labrets, tattoo, and jewelry of teeth and other animal tissues.

(5) Immense huts and shelters, open below, thatched roofs, hammocks, central and individual fires.

(6) Polished stone, no chipping; pottery massive; diagonal weaving; shell heaps or sambaquis, agriculture.

(7) Weapons are rounded bows decorated with feathers and geometric seizing; arrows barbed with bone or bladed; clubs.

(8) Travel afoot; navigation of rivers difficult by reason of rapids; on the coast of Brazil canoes and house boats.

The central Brazilian area, the Matto Grosso, lying between the eastward sloping roof of Brazil and the Andean Atlantic slope, largely between the Araguay and the western boundary of Brazil. It is a most complicated area in its environmental resources, its stocks and tribes, and its arts. Its characteristics are:

(1) Hot climate, wet, alluvial, forested; rivers flowing into the Amazon and the Paraguay, abounding in cataracts.

(2) Materials of arts: Few minerals, replaced by bone, shell, and teeth: palm wood, hard woods, excellent reeds, gourds, cotton; fish, turtles, birds, monkeys.

(3) Dietary mixed vegetable and animal, cultivated and wild; manioc, yam, beans, fish.

(4) Dress, little; clouts, pretty feather ornaments, jewelry of teeth, masks, labrets, nose ornament; no tatoo.

(5) Houses open shelters with palm-leaf roofs; hammocks, open fires; gourd and pottery dishes.

(6) Tools of shell, teeth, bone; spindle, diagonal weaving, sand painting, cassava manufacture, agriculture; pottery quite suggestive of mound-builders' ware.

(7) Bows of Peru and of east Brazil and intermediary forms; arrows with bone and reed points; throwing sticks Australian type, clubs, axes.

(8) Barefoot travel, headband and carrying frame; canoes of a single piece of bark (wood skins) and dugouts.

South of the Matto Grosso, or mixed region, lies the Argentinian pampas, shading down to Patagonia. Differing much in features from place to place, the culture is not altogether to be dissociated from that farther north. The characteristics are:

(1) Monotonous plains, pampas, from high grassy chaco to the bleak wastes at the south.

(2) Only near the western border any stone for working; fish, guanaco, American ostrich (*Rhea darwinii*).

(3) Food consists of roots, fruit, aquatic products in some places, flesh of guanaco, and rhea; no husbandry; Paraguay tea.

(4) Dress scanty, guanaco robes, woven blankets; foot gear of peltry, hair side out.

(5) The house, or toldo, of the Patagonian is an awning of guanaco skin; fuel of grass, open roasting; skin beds; pappoose hammocks and frames, the first south of California.

(6) Arts are skin dressing, sewing with ostrich sinew thread, weaving, and hunting; no pottery; no chipped stone southward.

(7) The weapons were the spear, the lasso, and the bolas.

(8) Locomotion aboriginally altogether afoot; now on horseback.

The Fuegian culture area terminates the American Continent southward, and yet on this desolate point, 55 degrees south, Brinton finds three linguistic families. The characteristics are:

(1) Rocky islands with numerous inlets between dangerous headlands; cold and wet climate.

(2) The material resources are siliceous rocks, beech trees, rushes; land mammals scarce; marine fauna rich; dogs.

(3) The dietary is mollusks and fish largely, sea mammals, whales, fungi; cooking in hot ashes.

(4) Clothing scanty; a skin worn hanging on the neck as a wind break; paint and ornaments.

(5) Their houses are miserable huts of wattling covered with grass; no furniture; fire made with pyrites and carried about in canoes.

(6) Their arts are in wood, bark, bone, and textile; shell knife; no stone art.

(7) For weapons they use stones thrown from the hand, poor bows and arrows, barbed harpoons, slings, limpet sticks, nets; no fishhook.

(8) Little travel afoot; small canoe sled; large canoe of beech bark, made in three sections, to be easily taken apart in portages across headlands.

Table showing American environments in

Area and physiography.	Chief minerals, plants, and animals.	Alimentation.	Dress and adornment.
1. Arctic.			
Six months day; ice and snow; country low along the coast.	Soapstone, chert, slate, pectolite; stunted vegetation, drift; abundance of fish, birds, and mammals of sea and land.	Drink water only; eat fish, seal meat, whale, reindeer, raw and seethed.	Sleeved coats and hoods; skins of birds, seal, reindeer, and intestines; tattoo; labrets.
2. Athapascan.			
Yukon and Mackenzie drainage; lowland, subarctic fauna and flora.	Poor in industrial minerals; birch, conifers, poplars; caribou, bear, birds, fish, and fur animals.	Drink water; meat, fish of lakes, berries, and bark.	Tawed caribou skin, much adorned with quill work and beads; gaiter-like moccasins.
3. Algonquin—Iroquois.			
Subarctic to temperate; lowlands, prairies, and indented waterways and coasts.	Quartzite, sandstone, soapstone, diorite; hardwoods, birch, wild rice, tobacco; game, fish, mollusks.	Diet varied, meat, fish, marine invertebrates, wild grains and fruits, maize; granaries; tobacco.	Tawed-skin shirt, leggins, moccasins (low and adorned); tattoo and paint.
4. Southern United States.			
Rich river valleys and low mountains; abundant rain; Gulf Coast subtropical.	River gravels; stone, granular and siliceous in place; timber, cane, tobacco, maize; game, fish, and sea products.	Fish, meat, mollusks, maize, wild fruits abundant; granaries; tobacco.	Slight; deerskin robes, mantles of wild hemp; bodies painted; moccasins.
5. Plains of the West.			
Piedmont sloping to immense prairies of Mississippi Valley.	Few minerals; jasper, pipestone; apocynum, bois diarc; buffalo. overwhelmingly.	Meat; fish a little; wild fruits, pemmican, kinnikinic.	Skin clothing; low moccasins; feather and quill decorations; body paint and mutilations.
6. North Pacific.			
Moist, warm climate; archipelagoes and mountainous coast.	Slate, granular rock; immense forests of conifers; sea fauna inexhaustible.	Fish diet, mixed with berries; snuff and pipe.	Clothing of bark and hair, woven in twined pattern; tattooing of totems.
7. Vancouver to Columbia.			
Stern coast, prolific inland waters; rich lands coast to mountains.	Siliceous and granular rocks; textile plants and forest timber, edible roots; fish, waterfowl.	Fish diet, mixed with roots and berries; no agriculture; stone boiling in basket and pit roasting.	Skin and bark clothing; gaiter moccasins; head flattening.
8. Interior Basin.			
Partial desert among mountains.	Siliceous and stratified stone; few fish; deer and other game; timber poor; seed plants abundant.	Dietary meager; bread, mush, soups, meat; in some cases grubs and insects; hot stone and roasting.	Buckskin clothing, rabbit-skin robes; high moccasins; no painting or tattooing.

association with aboriginal industries.

House and house life.	Manufactures.	Hunting, fishing, war.	Locomotion and transportation
Underground igloos of earth on timbers or whalebone; snow huts and summer tents; stone lamp stove, dishes of wood.	Chipping, sawing, grinding, carving stone and hard tissue; tailoring in skins; pottery a little in the west.	Harpoons, bird darts, fish darts, lance, fish-hook, net, trap, bow compound and sinew-backed.	Fur boots, ice creeper, sled, dog, kaiak, umiak; snowshoes, rude.
Conical bark lodges; baskets, pots, and dishes of wood, bark, and basketry; stone boiling.	No pottery; coiled basketry; bark vessels, excellent skin dressing and working; curved knife.	Bow and arrow, lance, nets, hooks, traps, and pounds, abundant and varied.	Snowshoes, excellent; bark canoes, toboggans, dogs; much portage.
Conical and cylindrical lodges of skin or bark; barracks, shell heaps; central fire; roasting and boiling.	Chipped and polished stone; poor pottery; bark dugout and wicker vessels; mortar grinding; skin working; twined basketry.	Club, stone knife, lance, tomahawk, bow and arrow plain, barbed spear, pound, trap, weir.	On foot; in canoes and dugouts; snowshoes, dogs, and portages at the north.
Huts of cane, with mud chinking, grass lodges, earthworks, shell heaps; open fire, smoking, roasting, seething.	Chipping and polishing stone; gray pottery, stamped; diagonal weaving.	Bows and reed arrows, blow tubes, weirs, tomahawks.	On foot; dugout canoes; rafts of cane.
Skin lodges in circles; earth lodge; furniture and utensils, and fuel from the buffalo.	Stone chipping; pipe making; hammerstone, hafted; twined basketry; quill and hide work; little pottery.	Little fishing; plain, compound, and sinew-backed bow, short arrow, club, lance, tomahawk.	On foot and snowshoes; bull-boat; dog and horse for riding and packing.
Communal barracks; totem posts, central fires; furniture and utensils of stone and wood; stone boiling in dugouts.	Carved wood, slate, bone; twined, square, and diagonal weaving in wood, bark, and grass; no pottery.	Harpoons, floats, gigs, weirs; arts created by fishing; daggers, skin armor, slat armor, slave killer.	Dugout canoes altogether; little land travel except packing over the mountains.
Communal houses; furniture in greatly varied textiles; fire in pits.	Flinty and granular stonework; carving in soft and hard material; no pottery; basketry of five types.	Harpoon, club, fishhook, traps; daggers, bows and arrows.	Dugouts, bark boats, monitor shape; open-work snowshoes; packing over the mountains.
Shelters; live out of doors; stick beds; vessels of twined baskets, pitched; mush baskets; fire outside.	Chipping stone; no pottery; good skin workers; twined baskets for vessels; seed gathering, milling, and cooking.	Sinew-lined bow, plain arrow, short clubs; round shields.	No artificial travel; carrying in conical baskets with headband.

Table showing American environments in

Area and physiography	Chief minerals, plants, and animals.	Alimentation.	Dress and adornment.
9. California and Oregon.			
Short valleys isolated enclosing rivers stocked with sea products.	No clay, siliceous and friable stone; fibrous plants, fruits, and woods abundant; fish, mollusks, and game.	Diet of fish, meat, acorns, pinyon; mush; stone boiling.	Buckskin and grass-fringed skirts, robes, and moccasins.
10. Pueblo region.			
Arid mesas and canyons among mountains; irrigable lands.	Shales, clays, gems; mesquite, yucca, agave, oak; deer, rabbit, antelope, coyote, puma.	Maize, pulse, melons, little meat; griddle and cooking pot.	Tawed skin and woven garments; formerly rabbit robes, feathers and paint; no tattooing.
11. Middle America.			
Mountains and tablelands, wet and dry season, isotherm 82° to 59° F.; vertical climate zones.	Friable stone, obsidian, jade-like stone, silver yucca, agave, cotton, maize, beans, peppers, fish, birds.	Maize ground, frijoles, griddle cooking; pulque, mescal, cacao, iguana.	Woven and bark garments, sandals of twine, hats, feather work, labrets.
12. Littoral and Insular Americas.			
Perpetual summer; no snow; mountains and insular areas in deep, clear seas; currents northwestward.	Granular stone, no chipping; shells, great canoe trees, cacao, manioc; no great mammals; fishes, birds, and mollusks.	Fish and mollusk, cacao, cassava, batatas, turtle, iguana, chicha, snuff.	Little clothing, bark cloth, feather work.
13. Cordilleras of South America.			
Elevated plateaus, with high mountains, gorges, desert coast, rainless, vertical climate zones.	Volcanic rocks, gold and silver; maize, potatoes, cotton, coca, cinchona, cochineal; llama.	Bread of maize, potatoes, fish, llama, guanaco, coca, chicha, salt.	Woven stuffs of cotton and wool; sandals, poncho.
14. Andean Atlantic Slope.			
Orinoco, Amazon, Maranyon, Madeira, Napo, etc.; tropical products; well watered and forested.	Minerals scarce; vegetation reeking; animal life arboreal and aquatic.	Fish, turtle, monkeys, peccary, manatee.	Bark cloth; feather ornaments, jewelry of teeth.
15. Eastern Brazil.			
Tropical; elevated tablelands between low sierras; forested; rivers full of cataracts.	Friable stone, clay; forests, palm trees, hardwoods; mollusks and fish.	Some maize and cassava, but chiefly on natural products of the soil; roasting and boiling.	Cotton, bark cloth, scanty clothing; labrets.

association with aboriginal industries—Continued.

House and house life.	Manufactures.	Hunting, fishing, war.	Locomotion and transportation.
Insignificant shelters, some under ground; no order in camps; shell heaps, granaries; fire in doors.	Excellent stone chipping; composite mortars; seven styles of basketry; twine, nets.	Sinew-lined bow and exquisite arrows, fish spears, slat armor, traps.	Poor boats, rafts; no snowshoes; conical carrying baskets with headband.
Under ground, crater, cave, cavate, cliff, mesa, and lowland pueblos; ladders; furniture and utensils of clay and textiles; ovens and open fire.	Polishing and boring stone; smooth, painted pottery; basketry five kinds, cloth; wall building; irrigation.	Bows and arrows rude; throwing clubs; nets for birds and rabbits; spears and axes.	On foot only; carrying with headband and toting with headring; sandals and moccasins.
Thatched and daubed hut, cut-stone buildings and temples, hammocks, granaries.	Stone hammering and chiseling, gem cutting, grotesque and painted pottery, paper, bark cloth; irrigation canals.	Atlatl and spear, bladed clubs, obsidian daggers, spears, slings; bows.	Dugouts, reed floats, professional carriers using headband and breastband, wearing sandals.
Thatched huts, often daubed or on posts; hammocks; no storage; chairs from single block.	No chipping; excellent carved and polished yokes, zemis, etc.; red pottery, stamped; shellwork and wood carving.	Clubs, throwing sticks, sharks' teeth, sword clubs, spears, tomahawk, or celt in pierced handle.	On foot; sandals of textile; dugout canoes; headband for carrying.
Fortified villages; thatched huts; bed on the ground; clay dishes; open fire; llama, dung fuel.	Hammered stone; huge buildings, little carved; metallurgy; pottery modeled; diagonal weaving, embroidery, quipu.	Sling, club with or without stone or metal head, saber of hardwood.	Afoot; log and reed balsas; carrying on men and llamas; suspension bridges; couriers.
Wooden houses, thatched; sleeping bunks, couvade.	Work in wood with tools of teeth, bone, and shell.	Blowtube, poisoned arrows, square sectioned bow, dried heads, shields, trident lances, drum signals.	Afoot little; canoes of bark; headband in carrying.
Immense huts and shelters, hammocks, central fire, shell heaps.	Pottery, diagonal weaving, agriculture; on the waters extensive fishing.	Rounded bows, decorated; barbed and bladed arrows.	Travel afoot; canoes and house boats.

Table showing American environments in

Area and physiography	Chief minerals, plants, and animals.	Alimentation.	Dress and adornment.
16. Mato Grosso, Central South America.			
Hot, alluvial; upper waters in torrents.	Few minerals; bone and shell; palm, hardwood, reed, gourd, cotton; turtles, plumage birds, monkeys.	Maize, cassava, yams, beans, turtle eggs, fish, smoking, roasting, cooking pot.	Little; pretty feathers and teeth; masks, nose ornaments; no bark cloth.
17. Argentina and Patagonia.			
Monotonous pampas, grassy plains to bleak wastes south; treeless.	Pampas grasses; huanaco; rhea.	Roots, some fish and sea products; flesh of ostrich and huanaco; open roasting with grass fuel.	Fur moccasins, huanaco robes, woven blankets.
18. Fuegian.			
Rock islands; precipitous; cold and wet; 55° south.	Siliceous stone; rushes, beech, marine fauna, birds, dogs; few mammals.	Sea animals, vertebrate and invertebrate; fungi; no storage; open fire.	Scanty; skin of seal, etc., for wind-break; paint and adornment.

association with aboriginal industries—Continued.

Houso and house life.	Manufactures.	Hunting, fishing, war.	Locomotion and transportation.
Open shelters, palm huts and roofs; hammocks; open fire, gourd and clay utensils.	Tools of shell, bone, and teeth; diagonal weaving; pottery, agriculture; graters; sand painting.	Mixed kinds of bow and arrow, throwing stick, clubs; ax; fish poison.	Barefooted; headband and frame for carrying; wood skins for boats.
Skin tolderias or awnings, open fire, grass fuel, cradle frames, skin beds.	No pottery, no stone working; weaving, skin dressing, ostrich-sinew thread.	Bolas; spear, hand noose.	Traveling afoot and on horse.
Miserable huts of wattling covered with grass; no furniture; fire made with pyrites.	Little stone art; bark, bone, textile work, shell knife.	Throwing stones, poor bows and arrows, slings, barbed harpoons, limpet stick, nets.	Section canoes of beech bark for portage; canoe sled.

THE COMPREHENSIVE ENVIRONMENT.

In closing, I desire to call your special attention to the ever increasing size and variety and comprehensiveness of the term environment as culture has advanced. At first, in what may be called the centrifugal condition of human evolution, the execution of limited environments went hand in hand with the production of races and varieties of peoples and languages and typical groups of industries. The overstepping of the boundaries of these in the course of time produced many changes of the profoundest significance in men and their activities.

First. The increase of knowledge was accompanied with the refinement, the intensifying, and the multiplication of desires and the means of gratifying them.

Second. These demanded longer journeys and the perfection of machinery; changes in commerce and the ministers of enjoyment.

Third. They demanded modification and increase of cooperative forces, of language, of law, of knowledge and intelligence.

Fourth. Growing by what it fed upon, these irresistible tendencies seized the whole earth, and henceforth it was one oikoumenē, one enclave, one environment.

ENVIRONMENT THE OCCASION NOT THE CAUSE OF INDUSTRIES.

From one point of view it would appear that all mankind and all arts are the outright product of this cunning environment. But a sober view, while it gives to the latter all deserved encomium beholds in the ingenious human creature the true source of all arts. I do not know a better proof of this than the fact that the withholding or the concealing of gifts by nature acts as a stimulus to ingenuity. Take, for example, the bow. There are regions where the wood for this implement is perfect, as in South America, or the hard-wood forests of Eastern United States. Here the very embarrassment of riches lead men to be satisfied with a very poorly made bow.

Now, the characteristics of a good bow are rigidity and elasticity. When our ingenious friend, the Indian, climbed the eastern slopes of the Rocky Mountains, away from the hard-wood forests, he invoked the mammals to yield the sinew from the leg or the scapula and with this he glues an elastic back upon his poor implement, or unites two or three horns so as to get his effect, the middle piece giving the columnar resistance, the wings putting to flight the arrow. By and by you approach the Hyperborean man, you ask him how he is going to have a bow. He tells you that he is in the current of progressive culture whose law is "the poorer the environment the greater the ingenuity." It is true that he has only brittle driftwood, that glue will not hold in his cold and damp clime, and that materials for arrows are scarce. The result of this is the sinew-backed bow and the harpoon arrow, together the most complicated and ingenious device ever contrived by savage mind.

The bow wood has one virtue, that of rigidity. By an ingenious wrapping of hundreds of feet of fine sinew thread or braid from end to end along the back with half hitches on the limbs, at every danger-point the virtue of elasticity is added and you have one of the most quickly responsive implements in the world. The arrow is quite as cleverly conceived, for it pierces its victim, acts as a drag or log to impede its progress and by its feather as a signal to the hunter in following his victim.

I am sure I should weary you if I should undertake to repeat this process of thought through the endless varieties of architecture, cooking, living, dressing, manufacturing, and going about. The story is the same. If men want houses, stoves, furniture, clothing, tools, power, or carriages or boats, they invent them, spite of environment, or rather by knowing and mastering the environment. As the size and shape of a cast is conditioned by the mold, not caused by it, industries are molded in the environment.

ALL ARE NOT IN THE CURRENTS OF CULTURE.

And now, in thanking you for your patience, let me say that in our comprehensive epoch, when all sunshine and all lands, and all winds, and all streams, and all terrestrial phenomena, and all history form the single and organized environment of every mind, it depends on each nation and each individual to say how much it or he will enter into the conscious occupation of this estate. Here in the nation's capital you may find men and women who can not read or perform any skilled labor whatever, who are the survivals of long past ages of ignorance and inexperience, who are only in the eddies of culture—in the zone of calms. Here also are the great minds of the world in touch with all culture. Between the two extremes are we, each and all, and I should be untrue to you if I did not implore each one before me to strive to be in the moving current as much as possible. We are the heirs of the ages and do not desire to be their prodigal son.

DUTIES OF THE FRIENDS OF TECHNOGRAPHIC SCIENCE.

When we turn our eyes toward that wonderful piece of architecture and sculpture called the earth, we need not ask in what laboratory it was executed. Time and Law were the workmen. The hills are almost as old as the earth, the streams of water are as old as the hills, the contours and coast lines are more ancient than man. All the forms of physiographic and vital existence are open for our study. The ground, the waters, and the air have been associated in the production of the earth as we now have it. More than all else the earth is the "heir of all the ages."

I need not tell a company of educated students that the living body of man is the inheritor of all general biological laws. To acquaint ourselves with these laws and to obey them is half the battle of life.

Now, few of us have learned this lesson and none of us profit by it. In that perfect day that is to come the heir of all the ages will look upon every indulgence that is fatal to life and to full intellectual activity as a sin and a crime against humanity akin to maiming and murder.

But there are higher laws of existence and the ages have richer treasures than gravity and physics and chemistry and biology.

A great philosopher of the past tells us that the spiritual life and the conquest of the earth are better than the ownership of the earth. This is what Tennyson meant by the ages of which you are the heir. The substitution of beast, water, steam, and electric power for mere bodily power; the substitution of mechanical devices and engineering for the hands and the arms of men; the development of literature, painting, lace work, engraving, sculpture, music, architecture, and landscape out of the natural sights and sounds of the world; the origination and perfecting of language; the gradual organization of the family, society, and government; the ever-improving explanation of the cosmos and ourselves called science and philosophy; the more ideal and less grossly material unfolding of the spirit world and the divine life within us are the inheritance of the present generation.

The heir of the ages is one who owns the ages. He is the master of the ages, not their slave. Their lands and resources, their powers and machines, their productions and commerce, their accumulations and enjoyments are his to control. The heir of the ages is a master spirit. He causes the fire to burn, he is not consumed by it; he causes the waters to flow, he is not overwhelmed by them; he passes through the deep, the deep can not enter him; he rides on the wings of the wind; he harnesses the lightning to his chariot. He is now the realization of the myth of Orpheus, at whose touch the rapid rivers indeed ceased to flow, the savage beasts of the forest forgot their wildness, and the mountains moved to listen to his song. All nature in his presence wore new charms. But the comparison does not stop there. This all-conquering son of Apollo, stricken for the loss of his sensuous Eurydice, pursued her to the under world. He was allowed to lead her thence on the promise that he would not look back. But when he turned to gaze on his lovely Eurydice she vanished forever from his sight. In unconsolable grief he gave himself to melancholy and was torn to pieces by drunken Thracian women. They threw him into the Hebrus, and it is said that its waters as they roll to the sea still whisper Eurydice, Eurydice! And thus the heir of all the ages, like a prodigal bird, perished in the electric light of his own passions.

There is a special sense in which this particular body of hearers are the heirs of all the ages. It is as the children and the heirs of science. Changing events and diversities of ambitions and interests will bring other men to our side and drive them away again. But the stamp of our intellectual kinship is upon us. Into our keeping must or ought to fall her interests and her good name. You should ever be foremost

in unselfish devotion, in zeal that looks for no recompense, in love that springs from intellectual maternity.

One by one or in groups the guardians of the past are surrendering their trusteeships. To-day it is a great secretary or a genius among discoverers who lays aside his pen; to-morrow it is a brilliant inventor or master mechanic; the next day it is a cunning hand that carries to the dark chamber its pencil or chisel which it can not will away; anon, a generous patron of science lives no more.

Now, who of all human beings should have a true and abiding interest in the preservation of these honored careers? Whose hearts should bleed when such men die? Whose hearts should be glad when they are honored, who in their unwritten wills gave and bequeathed to their children and heirs to have and to hold so long as they live and to hand down with accrued interest and betterments to their successors all true knowledge, all skill acquired with infinite pains, all the harvest of human industries that have been raised upon the generous and fertile environment called earth?